

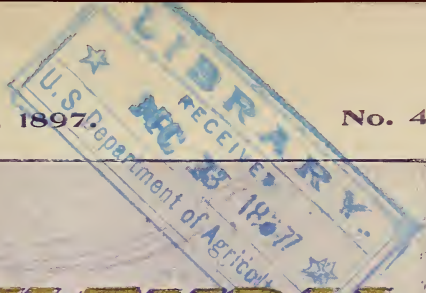
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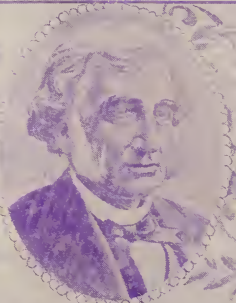
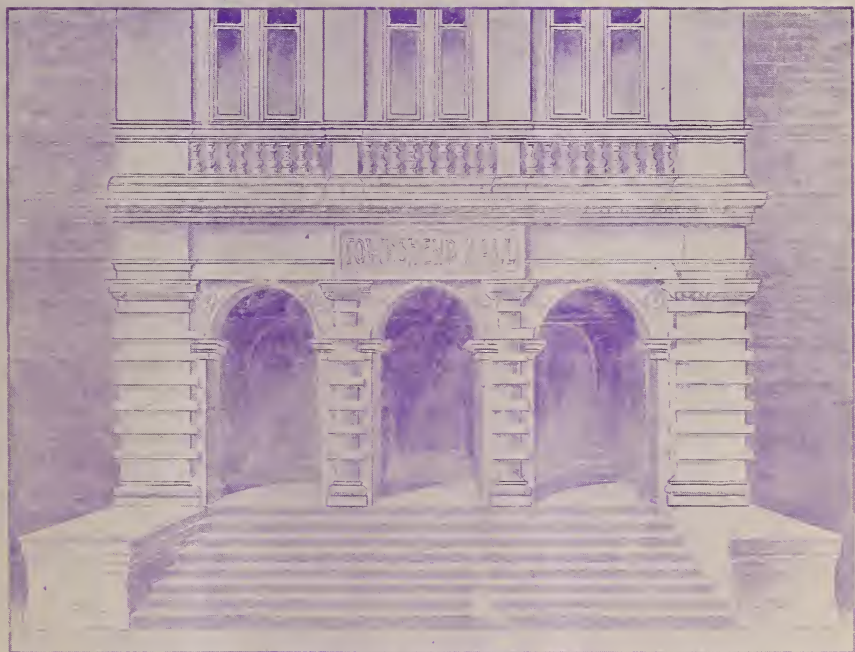
Vol. IV.

DECEMBER, 1897.

No. 4.



THE AGRICULTURAL STUDENT



J. S. MORRILL



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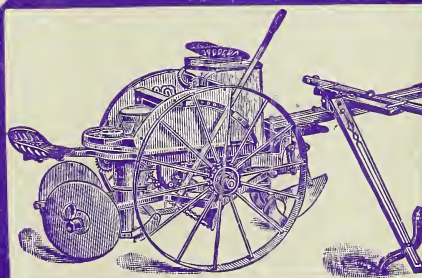
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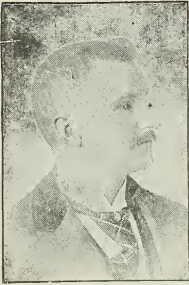
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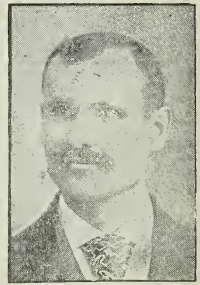
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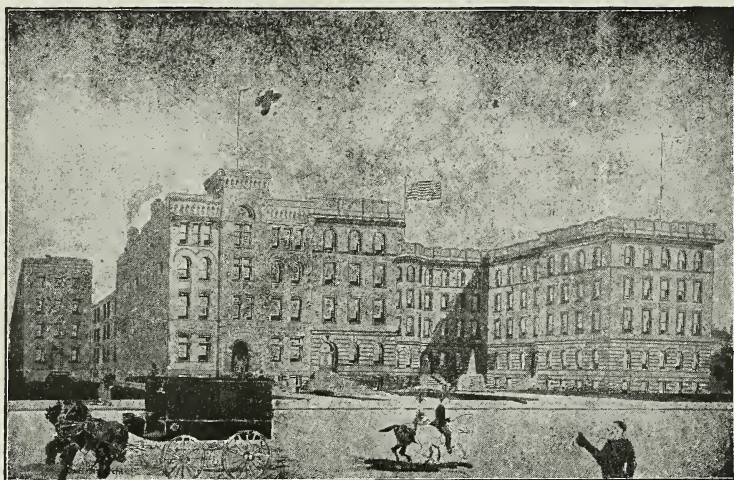
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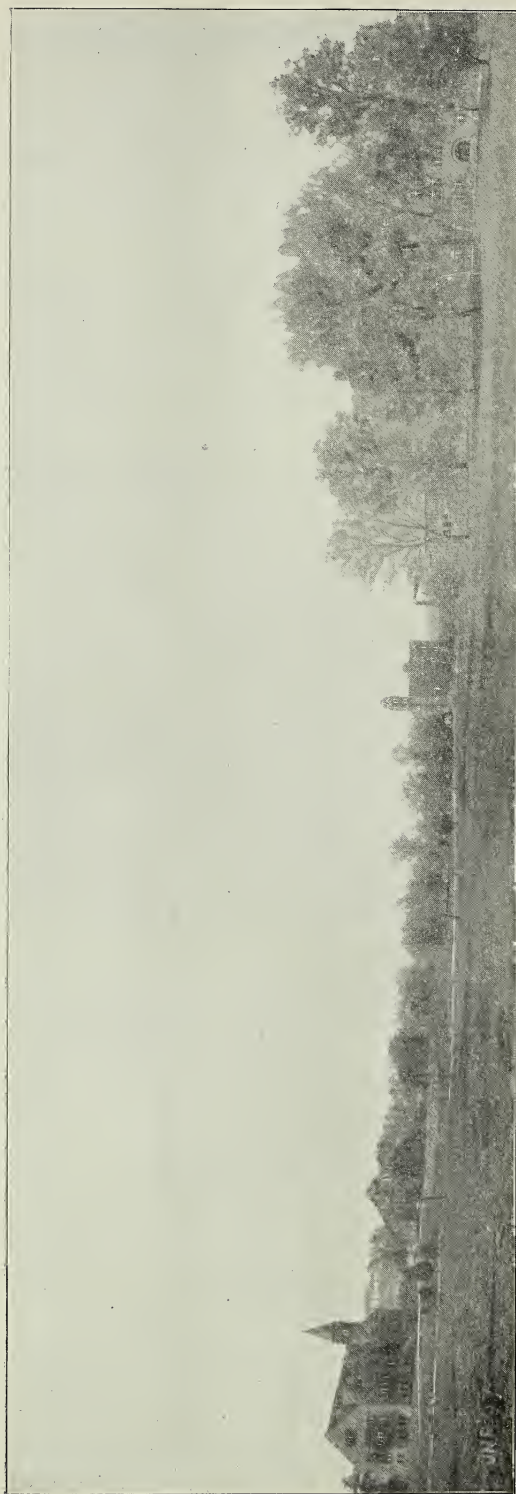
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VOL. IV. OHIO STATE UNIVERSITY, COLUMBUS, DECEMBER, 1897. No. 4.

TERMS OF SUBSCRIPTION.

One Year,	=	=	=	=	=	\$.50
One-half Year,	=	=	=	=	=	.30
Single Copies,	=	=	=	=	=	.05

While this paper is published with the consent and approval of the President of the University, and the officers of the School of Agriculture, the editors of this paper are alone responsible for the statements in all unsigned articles.

Address all communications to the Editor and Manager, Agricultural Student, Columbus, Ohio.

Entered at the Post-office, Columbus, O., as second class matter.

PUBLISHED MONTHLY BY

THE AGRICULTURAL STUDENT PUBLISHING COMPANY.

CHARLES W. BURKETT. - - Managing Editor.
JOHN F. CUNNINGHAM. - - Editor-in-Chief.

STAFF.

F. S. JOHNSTON,
C. J. MILLER,
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EDITORIAL CHAT.

The advent of scientific methods in agriculture is a necessary occurrence in the history of every country. It is not a great while since our own country was without the organized system of agricultural methods which we now have in our experiment stations and State Universities. And now we see by the Australian Farm and Home, of Melbourne, Victoria, that a system of scientific dairy education is to be inaugurated in that country. The Minister of Agriculture has arranged to have an analytical chemist deliver lectures and conduct practical demonstrations at several central butter factories in the most important dairying districts of Victoria. Among the lecturer's subjects are:

"The Commercial Estimation of Butter Fat in Milk and Cream."

"Payment by Results."

"The Estimation of Acidity in Milk and Cream."

"The Thermometer."

"The Hydrometer."

The instructor will spend perhaps a week in each of the factories and educate his pupils in his methods.

This is certainly a step in the right direction, and a very practical method of teaching has been adopted. But probably the greatest good will accrue from the desire for scientific methods that will be imparted to the factory managers. The paper above mentioned has this to

say of the project. "Scientific education will raise the standard quality of the butter we manufacture. Raising the quality will enhance the average value. If we can enhance the average value to the extent of 1d. per pound of the butter we annually export, it will mean a clear gain to the country of £100,000 per annum." This would certainly pay that district to have a scientific dairy instructor.

During the past summer we had reports concerning the probability of water famines in many Ohio towns. Next spring we will hear of damage done by high water in these same places. The people who have seen the "good old times" wish they were here again, as then these dry streams in the summer and floods in the spring were unknown. The seasons were held in balance by some unseen power. The reason for these extremes in the water ways undoubtedly lies in the removal of timber from the headwaters of the streams and their confluents. The cover of timber and vegetable mold acted as a sponge to hold the water and deal it out gradually. When these moderating influences are removed the water runs off of the bare land as it would from a roof. It all goes at once and then there is no more to come. A reforestation of the denuded lands is probably the only remedy we can find for water famines and floods. It is well worth a trial at least.

University News.

Townshend Hall, Biological Hall and the Gymnasium, the three new buildings upon the campus, are nearing completion. All three buildings are under roof or nearly so and much of the inside work is done. Townshend Hall, the future home of the agricultural education of Ohio, will be done by January 1, 1898.

Mr. Ernest J. Riggs, of the class of '95, of this University, has been appointed assistant to Professor Frank W. Rane, professor of agriculture and horticulture in the New Hampshire Agricultural College. Mr. Riggs will probably take charge of instruction in horticulture. He is especially well fitted for the place, having completed the course in horticulture and forestry in this university, and a year's postgraduate work at Cornell.

The Agricultural Students' Union will hold its annual meeting in Columbus on January 13, 1898. The address will be delivered by Professor I. P. Roberts, of Cornell University, upon the subject, "What May the Colleges of Agriculture do for the Advancement of Agricultural Knowledge?" All members of the union should be present as important business will need to be transacted.

Professor Kellerman had a short visit from Mr. W. T. Swingle, who is now in the employ of the U. S. Department of Agriculture, at Washington. Mr. Swingle was formerly Professor Kellerman's assistant in the University of Kansas. Of late he has been engaged at the sub-tropical station in Florida, but on account of the discontinuance of this station he will now be located in the Department at Washington, where he will make investigations to determine the conditions that influence the development of chlorophyll.

The Columbus Horticultural Society.

The regular monthly meeting of the Columbus Horticultural Society was held in Botanical Hall, Ohio State University, on the afternoon of Saturday, November 27. The subject for discussion was the "Pingree Potato Patch Plan." After the reports upon personal observations and of the several standing committees, Mr. Beattie gave a short talk upon chrysanthemums. Several fine specimens of this plant were upon exhibition. Mr. Sessions then read a paper upon the subject for the meeting, and this was followed by an animated discussion by the members of the society. The society then adjourned to meet on the last Saturday of December. The next meeting is the annual meeting and all members should be present as much important business will need to be attended to. Officers will be elected for the ensuing year.

There was a fine display of vegetables from the University gardens, showing what could be grown on lots. The stage was tastefully decorated by Professor Lazenby and Mr. Beattie to show the contrast of what is and what might be grown upon city lots. On the one side was the bank of healthy vegetables, and on the other a small thicket of rank weeds with a mulch of tin cans, brick-bats and other necessary accompaniments of civilization.

The State Grange.

The annual meeting of the Ohio State Grange will be held in Columbus, beginning on Tuesday, December 14. The meetings will be held at the Great Southern Hotel. On the evening of Wednesday, the 18th, a public reception will be given the delegates by the citizens of Columbus, at the Board of Trade Auditorium. At this reception addresses will be made by Governor Bushnell, President Canfield, Mayor Black and by various officers of the grange.

Miss Mary Kolbe will give some recitations, excellent music will be furnish-

ed, and a kinetoscope exhibition will be presented.

State Horticultural Society.

The Ohio State Horticultural Society held its thirty-first annual meeting at the Ohio Experiment Station, in Wooster, December 1, 2 and 3. Mr. E. H. Cushman, of Euclid, is president, Professor Lazenby vice president, and Mr. W. W. Farnsworth, of Waterville, is secretary.

Among the topics presented at this meeting were, "Nature Studies in Our Common Schools," "Sugar Beet Culture in Ohio," "The San Jose Scale"; besides reports on forestry, ornithology, entomology, etc. This society is in a flourishing condition and its meetings are equally interesting and profitable.

Equipping a Farm.

A Lady Having a Farm Which She Wished to Put to the Most Profitable Use, Wrote the Following Letter, For Advice, to an Editor of the Agricultural Student.

Mr. H. H. Loomis, Columbus Ohio:

Dear Sir—I received your letter of November 15, and hasten to answer. There is claimed for ——— a population of 8000. There are three railroads through the place, the "Chicago & Erie," the "Big Four," running from Sandusky city through Springfield and Dayton to Cincinnati, also the "Toledo & Ohio Central," from Toledo to Columbus, making easy access to the larger cities of the state. About a mile west on the pike (always a good road) I have sixty acres of land, nearly fifty acres under cultivation, the balance woodland, not so heavy, I think, but could be used for pasture. About a fourth of a mile west of that on the same road, I have forty acres, about thirty-two under cultivation. It extends to the Scioto river. There is a small orchard on it, but no buildings. The buildings are small on the sixty acre piece. There is a comfortable frame house of six rooms with summer kitchen

and woodhouse, cistern and splendidly drilled well over one hundred feet deep (I am told there is not better water in the country) orchard and a good, large barn and sheds. A very desirable place to live. How many cows do you think that would keep, together with the necessary horses? I talked with a dairyman in Michigan last summer who has been in the business for more than twenty years and he told me that the amount of ground I had would produce feed for a herd of twenty cows and four or five horses. I would like to have you make an estimate of what number you think it would feed, also the amount of money you think it would take to start a dairy that amount of land would support. Upon inquiry here I am told there are seven milk wagons at present delivering milk. That looks as though there was not a good opening for selling milk here unless one had some new scheme by which they could attract customers, but my hope is in a butter dairy, having some one that understood the business and then to find a place to sell in some neighboring city and ship on trial to secure a contract to furnish butter for some of our public institutions for the price would certainly be better than one could hope to get in a town the size of this. I believe that I have made a statement that you will understand and hope to hear from you soon your opinion of number in herd, amount of capital and all particulars. Respectfully,

The following letter was written in answer to the above:

Columbus, O., Nov. 25, 1897.

Dear Madam—I will endeavor to answer yours of the 20th, as best I can. If your farm is in reasonable good tillage, twenty cows and five horses is a safe estimate.

The success of a dairy depends much on the quality of the cows, and a good herd of cows is not easy to get. My judgment is that the best way is to buy as good cows as can be had without go-

ing into fancy prices and from time to time weed out such as do not respond to good care. Probably \$45 each would be about the cost of such cows.

Professor Hunt is of the opinion that there is more profit in selling milk or cream, if it is possible to get a market, and suggests possibly bottled milk and cream may not have been worked up in ———. A butter dairy costs more for equipment. He considers it would cost a least \$500 to furnish a modern outfit for handling the milk of twenty cows (and but very little more for 60 cows). I would think it best to begin with, say twelve cows, and try the market, and then increase along the line that seems most profitable. It seems to me that a cream separator would be necessary anyway, because there seems to be a growing demand for cream and the separator gives the nicest cream for the market, though if your water is cold enough, very good results could be secured by setting the milk. At my father's place we had fifteen cows and purchased a De Laval separator (Baby No. 2) for \$125, set it in a little room in the barn and ran it by hand, the cream being taken to the house and the butter made there. Now we have planned a small building near the house in which to make butter and wash things up. This plan worked entirely satisfactorily there. There is hard competition in the butter trade and to succeed it is necessary to build up a reputation and trade by degrees, and one must try to fit himself to the market, find out what people want and try to furnish it in the best possible form. So it would seem to me best to get acquainted with the possibilities of the market before a full equipment is put in.

As to other expenses I can only give you general estimate. Horses ought to be purchased for \$75 each. So that livestock would amount to about \$1300 and the necessary machinery, harness, tools, etc., might be roughly estimated at \$1200, making a total of \$2500. I would not be understood as suggesting

the immediate investment of such a sum, for I am firmly convinced that the best success in farming is secured by going slow and patiently gathering the best that one can as opportunity offers. But that some such a sum should be available for use if you wish to get somewhere near the best from that amount of land. And probably there will be need of some fixing up and repairing of the buildings. Now, thinking it will interest you, I will make a brief estimate of what would be the income for a butter dairy. Twenty cows would average two hundred pounds of butter each in a year, and I feel safe to warrant that after three years I could bring the average up to 300 pounds per cow. A herd average of 350 pounds to 400 pounds has been reached, but that takes time.

Twenty cows, 200 pounds, 4000 pounds, at 20 cents equals \$800. With skim milk I have succeeded in making a pig weigh 200 pounds when six months old, at 4 cents per pounds equals \$8. One ought to average from three brood sows, twenty such shoats ready for market both fall and spring, of forty in a year, \$320.

Veal calves would depend somewhat on the kind of cows, but one ought to get fifteen veal calves worth \$5 apiece, \$75. Say fifteen acres of wheat, twenty bushels to acre at 80 cents per bushel, \$240.

I have made these estimates without knowledge of the special conditions that are around Kenton and may be wide of the mark in some respects. I am of the opinion that some line of truck farming can be carried along with dairy farming. At home it was potatoes. I had worked it up there until I came to believe I could raise potatoes with profit for twenty cents per bushel, in an ordinary season. Kenton may not be in a potato region, but as close to a town of that size and shipping advantages I feel sure one could find some line that would return a profit, probably better than dairy-ing.

It would take three persons most of the year with such an equipment at a cost of perhaps \$1000 for labor.

I hope that I have made statements that you will understand. I have sought as far as possible to lay the facts before you. There is no immediate fortune in farming, but I believe it is a good, safe business, and to one who will go into it with his eyes open, who is determined to overcome every obstacle, and will stay by it through thick and thin, there is every chance of a steadily increasing income. I have not tried to make complete statements, time would not permit, nor would it be wise to try to do so without being actually on the ground. I have tried to give you a general view of the requirements and prospects of the business as I see it. Hoping this will be helpful to you, I am,

Very sincerely yours,

H. H. LOOMIS,

Columbus, Ohio.

O. S. U. Farm House.

Whitewashing with a Sprayer.

The use of lime, as a disinfecting agent is a universal practice. Long before the science of bacteriology was developed, lime was used in the form of whitewash, on the walls of cellars, farms and outbuildings, as well as on the walls of the dwelling house, not alone to add beauty to the appearance, but in the expressive language of the laity, "to sweeten up the buildings." In modern times whitewash is being largely displaced by paint. However, paint can not profitably take the place of lime, as a coating for the interior of buildings in which animals are housed; for in such buildings the interior with all its cracks and crevices, should be disinfected several times each year. Especially is this true of dairy farms. A cheap and efficient way of doing this is to apply a coat of whitewash.

To go over the walls of a large barn with a brush requires considerable time and labor, but Yankee ingenuity has

overcome this objection by applying the whitewash by machinery. In the larger structures, where whitewash is used, it is sprayed on by a method similar to the one used in painting the World's Fair buildings.

This method has much to commend it, as it is rapid, cheap and efficient. Cracks and crevices which could not be gotten at with a brush, can be easily reached and covered by means of the sprayer. All ladders and scaffolding can be done away with in structures of ordinary height.

We tried this method in the O. S. U. dairy farm last summer and the results were perfectly satisfactory, although we made several mistakes at first, due to inexperience.

A common spraying apparatus, such as is used for spraying fruit trees, was used for applying the whitewash. The barrel to which the pump is attached was placed on a wheelbarrow, so it could be easily moved from place to place. The lime should be slacked, at least twenty-four hours before using. In slacking add enough water to make a thin paste, to which add one peck of salt for each bushel of lime, and allow the mixture to stand over night. When ready to use, add water enough to make it about the same consistency as would be required were it to be spread with a brush. Then stir the mixture vigorously and allow it to stand a few minutes and all the hard, dissoluble lumps will settle to the bottom. It should then be strained before it is transferred to the spraying barrel. Unless it is strained, the hard particles and foreign substances will collect in the nozzle, and stop up the opening. A cheap and efficient strainer may be made by placing in the funnel four layers of common screen wire. Care should be taken not to put more whitewash in the barrel than will be used at one run, for if it is allowed to stand for several hours the lime will settle to the bottom in a dense mass which cannot be pumped out.

If the floors are to be kept free from whitewash, they should be covered with

straw or chaff. The hose, pump and nozzle should be cleaned immediately after using, as the lime soon hardens and when it once hardens it is not easy to remove. Two men with such an apparatus can spray a large amount of surface in a day, if care is taken to have the whitewash well strained and in good condition.

M. I.

Sugar Beets in Ohio.

(BY PROFESSOR H. A. WEBER.)

The depressed state of agriculture, owing to the low prices of our staples for a number of years past, has naturally given rise to a desire for the diversification of our crops in order to curtail the production of those which we have been accustomed to raise and whose supply in recent years seems to have exceeded the demand. The department of agriculture at Washington has labored assiduously for the opening of new fields in agriculture in order that the American farmer might produce at home such necessary articles of consumption, for which we were wholly or to a great extent dependent upon foreign importations. Prominent among the new industries proposed for the amelioration of the condition of American agriculture has been the home production of sugar, on account of our immense importations of this article, which in recent years have reached the enormous sum of \$80,000,000 to \$100,000,000 worth annually. It has been thought that if this money could be kept at home and a portion of the farm land which is now devoted to the production of grain and other staples could be employed in the culture of sugar-producing plants, the American farmer as well as the nation at large would be greatly benefited thereby.

Besides the production of sugar from sugar cane, the cultivation of which is confined to a limited area of the Gulf states, many attempts have been made from time to time to establish a sugar industry farther north, especially in the great corn belt of this country. Al-

though the sugar beet presents possibilities in the manufacture of sugar not attained by any other sugar producing plant, capable of being cultivated in this section of the United States, yet the early experiments in this direction were financial failures.

About the year 1880 a general interest was awakened in sorghum as a sugar-producing plant. The cultivation of this plant is much more in harmony with the prevailing practice of the American farmer, than that of the sugar beet. The plant was studied in all of its relations to the manufacture of sugar by the department of agriculture, as well as by other investigators in various parts of the country, among whom the writer took an active part. Factories fully equipped for the manufacture of sugar were established at Champaign, Ill., Sterling, Kansas, and at Franklin, Tenn., in which the writer was interested. The price of sugar at that time was three times the present price, and the outlook for the manufacture of sugar on a commercial scale from this source was not unfavorable. Unfortunately before the young industry was fairly upon its feet, it was overtaken by a falling market in sugar, owing to the overproduction of sugar in Europe, especially in Germany. It is safe to say that the prices of sugar, which then prevailed, will never be reached again, and, therefore, the profitable production of sugar from sorghum is impossible.

The only sugar-producing plant therefore, with which a sugar industry could be established in the northern states is the sugar beet. This plant has been brought to such a perfection by scientific cultivation and selection that it has become a successful rival of sugar cane, even in its tropical home. The statistics of the world's production of sugar show that at the present time the production of sugar from the beet is nearly twice as great as that from the southern cane. The shortage of fully 900,000 tons of sugar produced from cane, caused

by the war in Cuba, was readily supplied by the beet sugar-producing countries, without an appreciable effect upon the markets of the world, and, furthermore, it is safe to say, that if the cane sugar industry were entirely destroyed, the beet sugar industry, as now established, could readily supply the world's demand for sugar.

Through the efforts of Secretary Wilson and his corps of able helpers in the department of agriculture a general interest has been awakened in regard to the establishment of the beet sugar industry in our country. For the reason mentioned in the outset, these efforts received a warm reception on the part of the farmers of our country. The seed, which the department distributed for the sake of experimentation, was eagerly accepted and planted. The intention of the department in instituting the recent and general investigation with the sugar beet is to determine the localities best suited for the manufacture of sugar. This is the only rational method to be pursued. On account of the present overproduction of sugar in the world, and the consequently low price of sugar and small profits in its manufacture, it stands to reason that the proposed new industry can be successful only in such localities where the best conditions for the raising of rich sugar beets and their subsequent manufacture into sugar prevail, and there are doubtless many such localities in the United States. Rash enterprises in this direction, started blindly by enthusiasts in unfavorable localities, will be doomed to disappointment and failure.

Through the kindness of Hon. W. W. Miller, secretary of our state board of agriculture, who distributed the beet seed in our state for the United States department of agriculture, the writer obtained a list of parties to whom seed had been sent. From this list a selection was made representing a section of the state from the lake to the Ohio river. Requests were sent to these parties for samples of beets for analysis. Unfortunately,

ly, not all responded, so that the southern counties of the state were not represented. Four average beets from the largest down to about one-half pound in weight constituted a sample. The results are shown in table on next page.

DISCUSSION OF RESULTS.

The writer was ably assisted in the analytical work by Mr. A. E. Vinson, assistant in agricultural chemistry, O. S. U.

The counties are arranged in their geographical order, beginning with those in the north bordering upon the lake.

Of course sugar can be made from all of the beets represented in the table, but to manufacture sugar profitably under the present conditions, beets should contain not less than 12 per cent. of their weight in sugar, and the purity of the juice should not fall below 75.

The proper weight of a good sugar beet is in the neighborhood of 20 ounces. Very large beets are usually poor in sugar, and very small ones, although they may be rich in sugar, furnish too low a yield per acre, and are too expensive to handle.

Sample No. 1 represents the best beets in the whole list. The smallest beet weighed 20 ounces, and the largest 29 ounces. Their form was perfect. The percentage of sugar and purity of the juice are high. They were grown on black loam soil, one foot in depth, at Oak Harbor, near Lake Erie.

Sample No. 2 exemplifies in a high degree the possibilities of the lake region in raising sugar beets of a high grade. The smallest beet weighed 28 ounces, and the largest 71½ ounces, or nearly 4½ pounds. The high content of sugar and the purity of the juice as shown in the table are remarkable for beets of this enormous size. They were grown on black loam at Locust Point, on the lake.

Sample 3 was also grown at Locust Point on black soil. The smallest beet of this sample weighed 60¾ ounces, and the largest 70¼ ounces. Even these beets, with an average weight of 4

Number.	Producer and County.	Average weight of beets in oz.	Per cent. juice.	Per cent. sugar in juice.	Per cent. sugar in beets.	Coefficient of purity.	Date of harvest.
1	A. Wangreen, Ottawa.....	25	96.22	16.3	15.68	81.71	Oct. 13
2	J. F. Rider, Ottawa.....	55 $\frac{3}{4}$	97.20	14.2	13.8	81.42	Oct. 19
3	A. W. Rider, Ottawa.....	64 $\frac{1}{2}$	97.35	12.5	12.17	76.64	Oct. 19
4	John Fitz, Erie.....	39 $\frac{1}{4}$	97.19	15.2	14.77	77.67	Oct. 19
5	T. N. Gill, Erie.....	26	96.34	14.4	13.87	81.35	Nov. 2
6	J. T. Mackey, Erie.....	11	94.83	17.1	16.22	86.89	Nov. 2
7	Jac. Arbeit, Erie.....	31	96.39	14.0	13.49	79.77	Nov. 2
8	J. T. Clay, Geauga.....	30	96.85	12.1	11.72	74.64	Oct. 27
9	T. J. Myers, Seneca.....	28 $\frac{1}{2}$	94.67	15.5	14.67	81.13	Oct. 21
10	A. W. Hull, Seneca.....	45 $\frac{1}{4}$	96.87	13.4	12.98	71.97	Oct. 21
11	A. W. Hull, Seneca.....	20	95.73	17.0	16.26	73.34	Oct. 21
12	A. Covert, Seneca.....	18 $\frac{3}{4}$	96.79	12.0	11.69	68.53	Oct. 21
13	C. W. Heyman, Seneca.....	23	93.77	17.0	15.94	79.97	Oct. 25
14	L. H. Miller, Summit.....	23	96.77	9.9	9.58	67.02	Oct. 16
15	O. G. Herzog, Hardin.....	20	96.69	10.5	10.15	77.95	Oct. 27
16	L. B. Wing, Licking.....	19 $\frac{5}{8}$	96.56	10.1	9.75	68.06	Oct. 7
17	L. B. Wing, Licking.....	40 $\frac{3}{4}$	97.39	8.7	8.47	64.68	Oct. 7
18	L. B. Wing, Licking.....	15 $\frac{1}{2}$	95.95	11.5	11.3	74.34	Oct. 7
19	F. Brunner, Licking.....	22 $\frac{3}{4}$	97.19	9.8	9.52	74.19	Oct. 16
20	O. S. U., Franklin.....	7	96.27	13.2	12.7	80.49	Sept. 24
21	O. S. U., Franklin.....	6 $\frac{1}{2}$	95.36	13.0	12.4	77.84	Oct. 18
22	Hon. C. Merion, Franklin.....	20	96.04	13.1	12.58	79.49	Oct. 15
23	I. W. Coon, Franklin.....	10	95.75	12.3	11.78	78.24	Oct. 15
24	R. L. Holman, Clark.....	19 $\frac{1}{2}$	97.16	11.5	11.17	78.6	Oct. 19
25	Jac. Mitzel, Clark.....	18 $\frac{1}{2}$	96.59	14.4	13.91	80.0	Oct. 19
26	J. F. Shoemaker, Green.....	8 $\frac{3}{4}$	96.87	13.2	12.79	68.46	Oct. 13
27	G. W. Scott, Miami.....	19 $\frac{1}{2}$	96.97	11.9	11.54	79.28	Oct. 27
28	D. F. Shriner, Hocking.....	23 $\frac{3}{4}$	96.05	11.7	11.24	73.58	Oct. 13
29	James Porter, Pickaway.....	18 $\frac{3}{4}$	95.47	16.8	16.04	79.35	Oct. 18

pounds, are above the standard as laid down for the manufacture of sugar.

Sample 4 was grown on black loam at Venice, near the lake. The smallest beet weighed 20 $\frac{1}{2}$ ounces, and the largest 52 $\frac{3}{4}$ ounces. Although the size is above the normal by far, yet the content of sugar and purity are good.

Samples 5 and 6 were grown on clay loam and sandy loam, respectively at Port Clinton, on the lake. No. 6 has a very high content of sugar and purity of juice, but the beets are only about half as large as they should be, the smallest weighing 10 ounces and the largest 13 $\frac{1}{4}$ ounces.

Sample 7 was grown at Sandusky, on the lake, on black sandy loam. The smallest beet weighed 26 $\frac{1}{2}$ ounces, and the largest 35 ounces. Considering the size of the beets, the sugar content and purity are very good.

Sample 8 was grown in Geauga county, near Chagrin Falls, Cuyahoga county. The seed was planted June 12, and the beets, when harvested, were irregular in size and immature, which accounts for their poor showing in the table.

Sample 9 was grown at Attica on black soil, which had been manured the year before. The smallest beet weighed 24 ounces and the largest 41 $\frac{1}{2}$ ounces. Size of beets large and quality good.

Samples 10 and 11 were grown at Attica on light clay soil, which had an application of manure in February. No. 10 was transplanted June 12 and No. 11 was grown without transplanting. The beets of No. 10 were short and thick and had a large number of top roots (sugar thieves), and were in every respect worthless for the manufacture of sugar. The same is true of No. 12 from the same locality.

Sample 13 was grown at West Lodi.

Sample 14 was grown at Akron on clay loam, which had a liberal application of muck in the spring and of barnyard manure the fall before. The low purity of the juice is suggestive of excessive manuring.

Sample 15 was grown at McGuffey on muck (Scioto marsh). Planted May 15. Too low in sugar.

Samples 16, 17 and 18 were grown at Newark on gravelly, upland soil. No. 16 represents the average composition of the whole sample of six beets. No. 17 shows the composition of the largest beet, weighing $40\frac{3}{4}$ ounces. No. 18 shows the composition of the remaining five beets. As will be seen from the table the large beet was very poor, but even after throwing this one out, the remainder of the sample still fell below the standard for the manufacture of sugar. The beets were full of "sugar thieves," caused by stones in the soil or by a hard and impervious subsoil. Sample No. 19, from Hebron, Licking county, as will be seen from the table, was of a still lower quality.

Sample 20 is of fair quality in composition but absolutely too small for a good yield. This defect can, of course, be remedied by suitable preparation of the soil and proper cultivation. No. 21 shows that later the beets were inferior. They had at this time, October 18, taken their second growth.

Sample No. 22 was grown on black bottom land. Seed sown May 15. Transplanted June 25. The beets were very imperfect, containing a great many "sugar thieves." In composition they are fairly up to the standard.

Sample 23 was grown from plants received from same source as No. 22. Transplanted on light sandy loam July 1. The beets were small and full of top roots (sugar thieves).

Sample 24 was injured by flood in July. The beets showed second growth.

Sample 25 was grown at Fremont City, on sandy loam, manured with

chicken manure in the rows. Sugar content good and purity high.

Sample 29 has the most southern location of any of the samples received. The beets were grown at Leistville, Pickaway county. It may well be said here that "the extremes touch"; for outside of Seneca county it is the only sample received that at all compares in quality with the beets raised at or near the lake.

CONCLUSIONS.

The writer is well aware that it would be presumptuous to draw definite conclusions from the limited number of analyses made in this investigation. Furthermore it is evident from the condition of many of the samples that the inferiority of the beets was due to improper preparations of the soil and lack of cultivation. This would apply, however, to one section of the state as well as another. If the results of the work are worth anything at all, they clearly indicate that the region of our state bordering upon the lake has advantages in the raising of sugar beets of high grade, which the rest of the state does not possess. The leaves of the beet are the laboratory, in which the sugar is prepared for storage in the roots, and light is the agent. Consequently, other things being equal, a more northerly latitude has the advantage of more light during the growing season on account of the greater length of the day. So also the land bordering upon the lake and even for a considerable distance inland from the shore has the advantage of a more intense light produced by the direct rays of the sun in addition to the light reflected from the surface of the great body of water. Should subsequent trials prove definitely that these advantages exist, then the successful sugar factories will be found in that region, if found in our state at all. But until these vital questions are definitely settled, let the citizens of all portions of our state lend a helping hand to the work inaugurated anew by Secretary Wilson, and so ably conducted for many years by

Dr. Wiley, chief chemist of the United States Department of Agriculture.

Notes on Practical Forestry.

(PROFESSOR WILLIAM R. LAZENBY.)

Among the causes for the rapid decrease in the area of forest or woodland in Ohio are the following: (1.) The abundance, cheapness and convenience of coal; (2.) the value of nearly all the timberland for general farming; (3.) the great demand for wood for fencing, for the manufacture of charcoal and in the arts generally.

In the fall of 1882 seeds of a dozen or more varieties from native forest trees were collected and placed under suitable conditions for planting the following spring.

The selected list embodied the following species:

Wild black cherry, black walnut, yellow or black locust, sugar maple, catalpa (*speciosa*), red or scarlet maple, white ash, cucumber tree, black ash, burr oak, blue ash, scarlet oak, American chestnut, yellow oak, Kentucky coffee tree, beech.

Seeds of the above named species were sown or planted on the grounds of Cornell University in the spring of 1883. With the exception of the chestnut, oaks and black walnut, which were not transplanted, the different varieties were removed from the seedbed when one year of age.

The trees were grown in rows three and one-half feet apart, and two feet apart in the row. For the first few years they were carefully cultivated, but after they began to shade the ground no further cultivation was given.

From time to time, specimens of each of the above named varieties of trees were cut down and the annual growth in height and diameter carefully noted.

Among some of the more interesting points observed were the following: (1.) The increase in diameter of trunk did not bear a constant ratio to the increase in height, but appeared to be mainly dependent upon the leaf development.

That is, when the plantation was thinned the trees invariably branched lower, and while making a more rapid increase in diameter made a slower upward growth.

(2.) Some species grew with great uniformity despite the variation in season, while others presented a considerable difference from year to year. For example, the catalpa, white ash and yellow locust, represented the greatest variation in annual growth both in height and in diameter. The black cherry, black walnut, honey locust and oaks showed the least variation. In all cases the growth was the greatest when there was the most rainfall during the growing season.

(3.) When the foliage was injured or removed early in the season or the early growth was arrested by a severe drouth, it took several years to overcome this check to normal increase, no matter how favorable the seasons were immediately following.

(4.) The greatest annual increase in diameter of trunk invariably took place in the side most fully exposed to the light, but the greatest growth in length of branches was often on the side not fully exposed. That is, although there was a greater aggregate growth of limbs and branches on the most exposed side, the greatest growth in length for single branches was frequently on the shady side.

(5.) But one so-called "annual ring" was formed each growing season, and this was usually so well defined as to be easily counted. As a rule these rings furnish not only a convenient but reliable record of the age of trees.

(6.) The trees that made the most rapid growth were the following: Yellow locust, black cherry, catalpa, white ash and black walnut.

From time to time trees were cut down and the annual growth was examined. Among some of the interesting parts observed were these:

(1.) But one ring, and that clearly discernible in most cases, was found each year.

(2.) The greatest growth invariably took place on the side most fully exposed to the light.

(3.) Some species grew with great uniformity despite the variation in season, others presented a considerable difference from year to year.

(4.) When the foliage was injured early in the season or the growth checked by a severe drouth or fire, it took several years to overcome this, no matter how favorable the seasons were immediately following.

(5.) The increase in diameter of trunk does not bear a constant ratio to increase in height, but is largely dependent upon the leaf development, i. e.

The following table gives the diameter and height of average specimens of these trees after fifteen seasons of growth. The measurement for the diameter was taken one foot above the ground:

Diameter. Height.
Inches. Feet.

Yellow or black locust ..	9	42
Black cherry	7.8	38
Catalpa	8.2	44
White ash	6.1	36-8 in.
Black walnut	6	35-6 in.

The most rapid growth in height for any one year was made when the trees were three years old. The growth during this year was as follows:

	Feet.	Inches.
Yellow or black locust	5	1
Yellow or black locust	5	1
Black cherry	4	3
Catalpa	3	7
White ash	4	10
Black walnut	3	7

The measurements are the average of ten trees of each variety so selected as to fairly represent the whole number.

The Chicago Horse Show.

PROF THOMAS F. HUNT

In 1878, through the suggestion of President G. E. Morrow, of the Oklahoma Agricultural and Mechanical College, but then professor of agriculture in

the University of Illinois, there was established under the auspices of the Illinois State Board of Agriculture an exhibit of fat stock, including cattle, sheep and swine. This exhibit was held in the Exposition Building and was known as the American Fat Stock Show, and was the first fat stock show in this country and practically the only fat stock show that has ever existed in this country of a national character. In 1884 the American Dairy Show was added; in 1885 the American Horse Show; in 1887 the American Poultry Show. The American Fat Stock Show continued for seventeen years and was then temporarily abandoned for a variety of reasons, among which was the lack of a suitable home through the destruction of the Exposition Building.

When it was announced that the Fat Stock Show would be held again this fall under the auspices of the Illinois State Board of Agriculture it was a foregone conclusion that feeders would not be able to prepare a large exhibit in so short a time. When it became known that John A. Logan, jr., was managing the Horse Show with the citizens of Chicago and \$40,000 in premiums backing him, it was perfectly evident that a large number of entries in the horse department would be forthcoming. This combined exhibition was held in the Coliseum building, corner Sixtythird street and Jackson Park. This building is about 650 feet long, 300 feet wide, or about as long as the train shed of the Columbus Union Depot, and about twice as wide and much higher without a pillar or pier. In the south end of the building is a tanbark arena 110 feet by 300 feet. Around this arena are arranged in amphitheatre fashion, boxes, balcony and gallery seats, with a seating capacity of perhaps 20,000.

It is stated that the society people of Chicago paid \$11,000 for the privilege of occupying the 110 boxes.

The exhibition in the arena began at ten o'clock on Monday morning and

closed at eleven o'clock on Saturday night. The judging lasted from two and one-half to three hours each morning, afternoon and evening during the week. In the language of the theatres, not only was the acting good but the staging of the play was excellent. Thousands of dollars had been spent on the decoration of the building with red and white bunting, and an endless profusion of potted plants and in the somewhat spectacular dress of the attendants and employes. Some of those who love to call themselves the plain people were disposed to criticize the spectacular aspect of the Horse Show, including the full dress of the judges in the evening as well as that of the men in the boxes and the handsome toilets of the ladies. Referring to the fact that the box occupants were a part of the show, one gentleman was heard to remark that the show was all horse and millinery. It is, of course, a fact that a large number of people attended the show, who knew nothing about horses, and perhaps cared less, simply because it was a dress affair, but one who considers himself of the plain people is thankful to them for it, because it enabled him to see an exhibition of horses the like of which has perhaps never been witnessed before and which would not have been possible except through the patronage of society.

Taking the official catalogue as a guide the following table shows approximately the number of classes and the entries in each:

	Number of classes.	Entries.
Thoroughbred.....	5	14
Trotters and roaders ...	16	110
Coachers	71	204
Draft horses	42	150
Saddlers and hunters ...	42	231
Ponies	28	168
Horses in harness	24	196
Horses, carriages and appointments	23	110
Driving comp.....	16	55

	Number of classes.	Entries.
The Joe Patchen exhibit.....	1	4
	268	1342

As the same horse, in some cases, filled two or more events, there were something less than 1342 horses entered. There were perhaps between 800 and 1000 horses exhibited.

The entries in both the thoroughbred and trotting classes were small, but the trotting horse men have called attention persistently that in the harness classes the horses instead of being coaching bred were "bang-tailed" trotting horses. Many of these latter were trotting horses with good records. Among the breeding classes of trotters the four-year-old stallion, Caid, 2:11, took first premium.

In coach classes the leading exhibitions were made by M. W. Dunham, of Wayne, Illinois; E. M. Barton, Hinsdale, Illinois, and F. C. Stephens, Attica, New York. The first two exhibited French coach horses, while Mr. Stephens exhibited hackneys. The arrangement of stalls and the decoration in Mr. Dunham's exhibit was a model of beauty and the perfection of convenience to the visitor in seeing horses. Perhaps the most interesting exhibit in the breeding classes was made when Mr. Dunham showed Perfection and four of his get and Partisan, son of Perfection, and four of his get. There was thus in the ring ten coach horses including parent, children and grandchildren of extraordinary uniformity. It was a practical demonstration that French coach horses will reproduce their kind when they are properly mated. Royal Standard, the outstanding seven-year-old hackney stallion, belonging to Graham brothers, Clermont, Canda, took the challenge cup in competition with all coach breeds, and Mr. Barton's five-year-old mare, Palestine, took the challenge cup in such good company as Lady Sutton and Lady Valentine, two hackney mares belonging

to Mr. Stephens. There was a fair exhibit of German coach horses, but the Cleveland Bays, to use a street phrase, were strictly not in it. The Morgans had a class by themselves and made a favorable impression, the principal exhibitors being the Morgan Horse Co., Carpenterville, and Amos F. Moore, Polo, Illinois.

The draft horses were represented by Percherons, Clydesdales, Shires and French draft. The Clydesdale exhibit was certainly superior to any other draft breed. In champion mare classes, Mr. Robert Holloway, Alexis, Ill., took every first premium by ages and thus entered every horse in the challenge cup class. His two-year-old mare, Maggie Charming, took the cup, while in stallion class, Graham Bros.' three-year-old Clydesdale stallion, Young Mae Queen, won over all breeds.

The saddle horse classes contained the largest number of entries and were divided into gaited horses, hacks or walk trot and canter horses, and hunters. Among the gaited saddle horses of note were Monte Cristo, owned by J. T. Crenshaw, Scott Station, Ky.; Matilda, owned by General John B. Castleman, Louisville, Ky.; Rowena, owned by Miss Alice Castleman, Louisville, Ky.; Red Chief, owned by Ed Sinclair, Reeseville, Ky.; Miss Rex, owned by S. H. Fulton, Kansas City, Missouri. One championship won by Miss Alice Castleman with Rowena, over her father, General John B. Castleman, who exhibited Matilda. In the plain-gaited classes, the 6-year-old brown mare, Kathleen, exhibited by B. F. and Thomas Clyde, Brvn Mawr, Penn., took the championship. This imported mare was also a winner in the jumping classes, which probably attracted as much interest as any other class of animals exhibited, although perhaps not the best of their class were exhibited at this show. The principal exhibitors of ponies were, J. M. Hoag, Maquoketa, Iowa; C. E. Bunn, Peoria, Illinois, and Robert Lilburn, Emerald Grove, Wisconsin. An interesting pair

of trotting bred horses named "Cat" and "Rat," each fourteen hands and one inch high, were exhibited by Dr. Gagnon, of New York, in the pony class. They were very handsome small horses, but were manifestly not of the usual pony type. Among the novelties of the show was a four-year-old pony twenty-six inches high and weighing 48 pounds, while nearby was a three-year-old barrow, said to weigh 1000 pounds.

Next to the saddle horse class the horses in harness attracted the most attention on the part of the city people. The harness classes were filled up partly if not entirely with trotting bred horses, frequently of very ordinary conformation, the principal requisite being that they should have a trappy action and a stylish appearance in motion. They were all docked, wore a crupper not less than one inch thick, blind bridles, curb bit to which the lines were attached, and a snaffle bit to which side reins were fastened. Inasmuch as the same horse could be driven to several kinds of vehicles, and in various kinds of harness, and either single, double, unicorn or four-in-hand, a few horses could fill a large number of entries. In the classes entitled "Horses, Carriages and Appointments," the horses are almost lost sight of in the elegance and grandeur of the equipment. No one need expect to win a premium in these classes who was not faultlessly attired or did not sit in the proper attitude, or did not hold his whip in the conventional manner. The two equestrian clubs, with sixteen horses in each club, aside from officers, competed, in which drill was to count 25 per cent., equipment 25 per cent. and mounts 50 per cent. A member of the winning club was heard to remark that their competitors rode the best, but that they won because they wore derby hats and had fair leather bridles, while their competitors wore silk hats and some of them had white bridles.

Star Pointer, 1:59 $\frac{3}{4}$, Joe Patchen, 2:01 $\frac{1}{4}$, and Ellrose, 2:09 $\frac{1}{2}$, holder of the

two-year-old trotting record, were all exhibited and attracted a great deal of attention in their stalls, although very little in the arena.

There were, perhaps, all told, 150 head of cattle on exhibition, half of them perhaps, or more, being entered for the Clay Robinson special of \$500, \$300 for first and \$200 for second, for the best carload of fat cattle. There were three carloads of Angus, two of Hereford, and two of Shorthorns entered for this prize. The Aberdeen-Angus exhibited by L. H. Kerrick, Bloomington Illinois, took first prize and the Shorthorns exhibited by Harry Schirding, Petersburg, Illinois, took second.

In the individual classes the grand sweepstakes was taken by "Jack," a two-year-old Hereford steer, weighing 1830 pounds, and exhibited by W.S. Van Natta, Fowler, Indiana. It is interesting to note in this connection that the championship has been won at eighteen fat stock shows as follows:

- 8—Grade Shorthorns.
- 4—Pure-bred Shorthorns.
- 3—Pure-bred Herefords.
- 2—Cross-bred Hereford-Shorthorns.
- 1—Pure-bred Aberdeen-Angus.

There was a small, but fair exhibit of sheep, among which were some good sheep exhibited by the Wisconsin Agricultural Experiment Station entered for the Shropshire Association's Special.

The only redeeming feature of the swine exhibit was that of the Iowa Agricultural Experiment Station. Professor Curtiss exhibited a pen of about ten each, of Poland Chinas, Berkshires, Chester Whites, Large Yorkshires, Duroc Jerseys, and Tamworths, all having been fed on a standard ration to determine whether certain breeds could be profitably raised for bacon in place of for ham and lard. In addition there was also a pen of Duroc Jerseys, fed a ration with a narrow nutritive ration, and another pen fed a ration with a wide nutritive ratio. It was thus a combined breed and feed test. Through the courtesy of Professor Curtiss, the writer had

the opportunity of seeing these hogs slaughtered and dressed at Swift's Packing House. It was an extremely interesting carcass exhibit and the public may expect some valuable information when Prof. Curtiss gets his data completed.

Principles of Feeding.

Much valuable information regarding scientific principles of feeding has resulted from the investigations of the agricultural Experiment Stations of this and other countries, within the last four decades. Up to that time, feeding was carried on in a haphazard way; now it is positively known that it rests upon well defined principles. These investigations have shown that body materials are continually being consumed in the processes of life, and that food must be supplied to furnish new materials, in order that the ordinary functions of the body may be performed and that the body itself may be in a healthy and vigorous condition. The animal body has various requirements, and these requirements are met with the food we furnish. The energy, the force used in the performance of work, the muscles, the heart, the milk, the nerve force are all maintained by the supply of food. The object is to furnish these nutrients for the body, in the best form to meet these various requirements at least cost. This is scientific feeding.

The animal feeds from plants. Hence the materials needed by the animal body must come from the plants. And the animal has not the power to convert one ingredient into another. It can only convert the plain ingredients into animal ingredients.

And the fact is, that the plant and animal composition is about the same when it comes to the substances that compose them.

These substances are divided into five groups, as follows:

Water: In animal the amount is from 40 to 60 per cent., while in plants it may be from 8 to 15 per cent., as in

hay and grain, or as high as 80 or 90 per cent. in silage or roots. The animal in eating plants take up this water in the food, but it is of no more benefit to the animal than water which it drinks.

Ash is what is left when the combustible part of the feeding stuff or the animal is burned away. The animal contains all the elements that a plant does, besides sodium and chlorine, which the plant may not contain.

Fat: Both plants and animals contain this substance. When an animal feeds, the fat of the plant is either stored up in the body as fat or burned to furnish heat and energy.

Carbohydrates: Found only in plants, not in animals and includes starch, sugar, gum, fiber, etc.

It is the largest part of our foods, and is stored up in the body as fat or burned in the system to produce heat and energy.

Protein is the name of a group of substances, having nitrogen as the basis. This group is the lean flesh producer and enters prominently in the production of blood, milk, nerves, the organs, etc. It is the most important and expensive of the materials. It is found in both animals and plants.

We read in agricultural papers and books about such terms as protein and carbohydrates, but do not understand them, they seem as Greek to us. So let us define them in just simple terms, and look at the whole subject in that respect. Protein is that part of a food that goes to make up the muscles, the flesh, the blood, skin, tendons, nerves, wool, and milk. These parts of the animal must be produced and it is produced from this class of substances in the grain or hay. If the animal does not receive the proper amount of protein for the process of the body it goes to its own flesh and takes the protein from there, and then we say, "that animal is growing poor." It is absolutely necessary therefore, to supply the animal with a certain amount of this "muscle or flesh former" food. The fat and carbohydrates of the food go to lay up fat in the body or are burned in

the system to produce heat. We put coal or wood in the stove, the fire is started and heat is produced. Now, in the same way the fat and carbohydrates are taken in the system, the oxygen comes in contact and combustion takes place and produces heat in the body. Protein will do this to some extent, but the fat and carbohydrates of the food furnish this heating material in main.

We pay no attention to the water and ash, for the former is supplied in drink, and the latter is usually, with exception of sodium and chlorine, found in sufficient quantity in the plants. Common salt is fed to supply the chlorine and sodium. This covers the basis of foods. We see, too, that protein serves a different purpose in the animal than fat or carbohydrates. Another consideration is the relative amounts of these substances in a feeding stuff. This relation is expressed by the term "nutritive ratio," and nutritive ratio is simply the proportion of the digestible protein to the digestible carbohydrates and fat, and when these three substances, the "flesh formers," the fat and "the heat producers" are in the right proportion the ration is "balanced." If it contains too much of the "heat producers" and too little of the "flesh formers" it is not balanced. What then is a balanced ration? A ration is balanced when the proportions of the protein, fat and carbohydrates are such as to insure the best use by the animal of all the food constituents contained in it. It is unbalanced when the proportions are such as to indicate a waste of one or other classes of food compounds, because contained in quantities in excess of needs of the animal.

From a large number of feeding experiments it has been found that for certain purposes, certain amounts of protein, fat and carbohydrates are required, daily, to get the best results. For example, a milch cow weighing 1000 pounds in full flow require 24 pounds of dry matter, which should contain 2.5 pounds of digestible protein.

12.5 pounds of digestible carbohydrates and .40 pounds of digestible fat, which gives a nutritive ration of 1:5:4, or a food or combination of foods, which furnishes one pound of protein or the "flesh formers" to 5.4 pounds of the fat and carbohydrates or the "heat and fat producers."

Following is the nutritive ration of a few of our prominent foods:

Corn silage	1:12
Corn straw	1:12
Clover hay	1:5.4
Timothy hay	1:15
Wheat straw	1:4.8
Potatoes	1:16
Corn	1:10
Oats	1:5.8
Wheat	1:8
Corn and cob meal	1:12
Wheat bran	1:4.
Gluten feed	1:2.5
Linseed meal	1:1.7
Milk	1:3.3
Skim milk	1:1.7

You will observe that for a dairy cow there should be fed a ration containing one pound of digestible protein to 5.4 pounds of digestible fat and carbohydrates. Now it is the practice of a great many farmers to feed just corn straw and corn, thinking this will make a "balance ration." Glancing back to our table we see that the nutritive ratio of corn straw is 1:12 and of corn 1:10, the requirement being 1:5.4. Thus we see the corn straw and corn ration is too "wide," that is, not enough protein. On the other hand, if wheat bran were fed alone, we would be feeding a ration, having too much protein and not enough of fat and carbohydrates, hence, bran is too narrow. To illustrate, we have:

1:12	1:5.4	1:4
1:12 is too wide; 1:4 too narrow; 1:5.4 just right. Hence we must bring the two extremes together to meet the mean, and doing this is what is meant by compounding a ration.		

Foods vary much in composition, and we can usually make up a ration, more cheaply by using three or more foods.

So let us make up a daily ration for dairy cows of 1000 pounds live weight. We give some here as examples and these can be used right in practice, on the farm, for one cow or twenty or more:

A

Formula.	Organic matter	Digestible nutrients		
		Protein	Carbo-hydrate	Fat
25 lbs. corn straw...	14.13	.50	8.35	.15
10 lbs. bran.....	8.24	1.26	4.41	.29
4 lbs. corn	3.30	.25	2.59	.20
Totals.....	25.87	2.01	15.35	.64

B

25 lbs. corn straw...	14.13	.50	8.35	.15
6 lbs. bran	4.94	.25	2.65	.17
4 lbs. corn.....	3.50	.25	2.59	.20
2 lbs. gluten meal..	1.70	.51	.66	.14
Totals.....	24.27	2.07	14.25	.66

C

12 lbs. clover hay...	10.16	.79	4.24	.20
20 lbs. corn silage...	4.18	.11	2.36	.13
4 lbs. corn meal....	3.40	.28	2.61	.13
4 lbs. wheat bran..	3.54	.48	1.65	.11
2 lbs. gluten feed...	1.85	.51	.88	.17
Totals.....	23.13	2.07	11.74	.74

D—O. S. U. Dairy Ration.

45 lbs. corn ensilage.	11.5	.60	5.1	.29
8 lbs. clover hay...	6.8	.53	2.82	.13
2 lbs. corn.....	1.8	.16	1.31	.07
3 lbs. bran	2.7	.35	1.23	.09
2 lbs. gluten meal..	1.8	.56	.88	.17
Totals.....	24.6	2.10	12.05	.75

Horses, hard at work need a ration, about as narrow as dairy cows, but not so much rough food and more grain should be fed. During the winter time, we get good results by feeding our horses the following ration:

Cut corn fodder, what they will eat. Seven and one-half pounds of bran. Seven and one-half pounds of corn cob meal and oats..

Pigs, on the other hand, need a food containing but little fiber, and rich in the muscle formers. There should be a distinction between fattening and growing animals. For the former, there is possibly no better food than ear corn. But growing pigs and calves need the protein substances. Pasture grass is good for both. Calves should be fed corn and hay with milk, for milk alone is too narrow. Hay cannot be fed to pigs, but shorts or meal can.

Following are two rations for pigs, the quantities being the daily amount for each one hundred pounds of live weight.

Corn, Shorts, Milk Rations—Pounds.

	Fresh substance	Dry substance	Digestible matter	Digestible protein
Corn.....	2.5	2.23	1.92	.22
Shorts	.5	.44	.33	.05
Milk	7.5	.71	.71	.23
Totals.....	10.5	3.38	2.96	.55

Corn, Shorts, Gluten Meal Rations.

	Fresh substance	Dry substance	Digestible matter	Digestible protein
Corn	2.5	2.23	1.92	.22
Shorts	.5	.44	.33	.05
Gluten meal	1.0	.91	.79	.26
Totals.....	4.0	3.58	3.04	.53

This then covers the subject as fully as this article will permit, and in closing we want to emphasize this point, that feeding by guess work has passed, and to get the best results we must use the best methods, and best judgment in the care of our animals and the selection of food for them.

Regarding Carbon Bisulfid.

Carbon bisulfid is a clear, very volatile bad smelling liquid, which has become extremely useful for killing insects in granaries, mills, and in stored food products of all kinds. It is also used for gophers, rats and ants in hills.

Here in our Southern homes we are bothered with a great many very aggra-

vating little household pests, like bed-bugs, crickets, cockroaches, ants, the little silvery "fish moths," clothes moths, book lice, carpet beetles, etc. Numerous remedies have been suggested for combating these various pests, so many in fact that for their accurate use a special "Receipt Book" would be necessary to point out to the housewife the particular remedy necessary in each case. However, now, a happy deliverance has come to us in the form of the beneficent Carbon Bisulfid. By its use a house can be completely ridden in one night of not only all these, but all rats and mice with them. It will necessitate leaving the house for one night, but the end will, in most cases, justify almost any means.

Carbon Bisulfide is an extremely explosive substance, and it will not do to inhale it, but it can be used readily if ordinary care be exercised. Its odor, while very rank, will yet disappear very rapidly and completely in fresh air. Moreover, when used to kill insects infesting various food products, like the weevils in grain or peas, or beetles in flour, it leaves no discernible taste behind it. If the proper care be taken to see that not a spark of fire exists anywhere about the house or is carried near the house while it is being treated, no ill effects will follow the use of Carbon Bisulfid.

In making preparations to treat the house, first see that all windows, doors, ventilators, chimney openings and fireplaces are securely closed, and all fires entirely extinguished. Now go through the house and rapidly pour the liquid into large pans, previously conveniently placed, at least a pound to the medium sized room. It would be better if these pans were set up on tables or shelves. Place some also in closets and cupboards. Start with the attic, if there be one, and proceed rapidly down and out, closing all the doors. If the outside doors have broad, open spaces beneath, close these with rugs or something of the sort, and look for any other openings that might be stopped up. Next morning the doors

may be opened and the house aired out. It is used on these same principles in stores, warehouses, granaries and mills.

The Carbon Bisulfid costs ten cents per pound in fifty pound lots and twelve cents in ten pound lots. Several clubbing together could obtain it at a very small cost. When not in use store the tightly closed can in a cool place.—Bulletin 86, Alabama Exp. Sta.

Education in Domestic Science.

"The Ohio State University is to be congratulated on its tendency to develop education along useful lines. The latest manifestation of this tendency is the equipment of the some-time-ago heralded department of Domestic Science, which will undertake to teach young women as to household economics, cookery, sewing, nursing, millinery, dress-making, art needlework and other things that women, to be successful in their allotted life-work, should know. For some years it has been manifest that girls were more and more disposed to shirk this work, to leave it to the mother or the servant, while they drifted into shop work, the store and the office. The tendency among girls has been to regard housework as unworthy of their best efforts, and the result has been a deplorable lack of skill in the event of unexpected, but stern, necessity. The home has been robbed to cheapen or improve work in other less important places, and the result has in many cases been distressing, not only in the loss to the home, but in the unfitting of the girls for their real work and, too often, in their temptation and ruin. It is a splendid task to which this department of the University is to be devoted. It will be, perhaps, at first difficult to turn the tide of sentiment back into its proper channels, but in whatever degree it is successful, it will be a blessing, not only to those whom it immediately reaches, but also to those whom it may influence."—Columbus Dispatch.

Our Exchanges.

We are in receipt of the October number of the New Hampshire College Monthly. This periodical is an illustrated magazine published monthly throughout the college year by the students of the New Hampshire College of Agriculture and Mechanic Arts. It is bound in a cover of heavy gray paper, tastily decorated, and is a creditable publication, both to the board of editors and the college.

We are happy to receive the PHAGOCYTE from the Ohio Medical University. This publication is in the second year of its existence. It is a monthly magazine, has twenty-four pages of reading matter and is a credit both to the loyal men who compose its editorial staff, and to the University which it represents in the journalistic world.

Insecticides and Pumps in General.

Every farmer and gardener should certainly own a good spray outfit, and a small stock of the standard insecticides and fungicides like Paris Green, Copper Sulphate (for making Bordeaux mixture), Whale-oil Soap and Carbon Bisulfid. It pays, most emphatically, as has been proven by repeated trial and long actual use. To the most successful operators they have become essential.

A great many patent insecticides are now on the market under various trade names, though most of them are mixtures, with some one or more of the old staple insecticides as a base. These are often not to be compared in effects and generally not in price with the best brands of the pure articles, and I would recommend that the latter always be purchased. Prepared Bordeaux mixture and kerosene emulsion are sold in small packages, but I should always advise the use of a fresh preparation—home made.—Bull. 86, Alabama Exp. Sta.

Good Books.

THE PROCESSION OF THE FLOWERS, by Thomas W. Higginson, New York; Longmans, Green & Co., \$1.25. The six nature sketches included in this little volume are, *The Procession of the Flowers*; *April Days*; *Water Lilies*; *My Out-Door Studies*; *The Life of Birds*; *A Moonglade*. Reading this book is like dipping into poetic beauty and drawing out sweet suggestions and thoughts that are as quiet and restful and refining as a dream in the enchanted land of Nature. There is nothing dull or dry about it, but every page is saturated with a fragrant moisture, sweet, cooling, exhilarating, that tells how charming and dear Nature's creatures are if we will but observe them.

—o—

BESIDE OLD HEARTHSTONES, by Abram English Brown, Boston; Lee and Shepard \$1.50. In "Beside Old Hearthstones," Mr. Brown continues to trace the footprints of the patriots in the history and tradition handed down through their descendants. This volume covers a region not so familiar to the public, but teeming with interest. At very many homes are met descendants of the participants in the stirring scenes of the Colonial and Revolutionary Wars. These people tell the trials of the early days as they affected their ancestors, whose record has never before been given to the world. They also bring forth many tangible reminders of those days when independence was obtained. It has been the aim of the author to seek out these descendants, and to gather many narratives which have not been incorporated in any history, and which would otherwise be lost.

—o—

THE STORY OF THE BIRDS, by James Newton Baskett. This charming work represents a class of books in great demand today—those that present science in such a way that the young may grasp it and that everyone will be attracted by it. The author presents in a charming and unique style

the results of his own experience and deduction, "along with much that is well known to all ornithologists." In the author's words, this book "does not pretend to tell the whole story of the birds, even if it could be told. Its aim is simply to present in a rather unusual, yet popular way, the more striking scientific features of their probable development." This book should find a place in all public libraries. Published by D. Appleton & Co., New York. Price, sixty-five cents.

—o—

HANDBOOK OF BIRDS OF EASTERN NORTH AMERICA, by Frank M. Chapman. This book is a standard work upon birds. It contains keys to the species and descriptions of their plumages, nests and eggs, their distribution and migrations, and a brief account of their haunts and habits, with introductory chapters on the study of ornithology, how to identify birds and how to collect and preserve birds, their nests and eggs—in fact, it is a complete handbook for the ornithologist. The book is illustrated with full-page plates in colors of black and white and upwards of one hundred and fifty cuts in the text. Published by D. Appleton & Co., New York. Price, \$3.00. Pocket edition, flexible covers, \$3.50.

—o—

PLANT BREEDING, by L. H. Bailey. This valuable work is one of those books which fill the gap between the practical and the theoretical. It brings theory and practice together and unites them as one. It is a work for student and gardener, teacher and pupil. It deals with the functions of plants, the effect of environment, the philosophy of variation, the philosophy of crossing, how domestic varieties originate, and such subjects so important to the horticulturist and scientist. The book should have a place in all college libraries. It is written in a very pleasing style. Published by the MacMillan Company, New York. Price, \$1.00.

SCIENCE SKETCHES, by President Jordan, Chicago; A. G. McClurg & Co. A book just issued which contains a new and enlarged collection of popular essays on science studies. There is an entertaining interest running through the book, making it pleasantly readable in every respect. It is intended to arouse a purely scientific interest in subjects closely connected with human life and sentiment. This book is entirely free from that condition of dryness that is often met with in scientific essays. There is that unimaginative humor and interest peculiar to Dr. Jordan, which is manifested in these science sketches. Possibly there is no subject harder to realize and understand than the "scientific idea of things." The writer believes this is one of the very best books for furnishing such information. Written in a simple and popular style, we can think of no one book that would be more likely to interest and instruct. Without a question, it should be included in the different teachers' and pupils' Reading Circles throughout the country.

THE THEOLOGY OF AN EVOLUTIONIST, By Dr. Lyman Abbott, Boston; Houghton, Mifflin & Co. It is rarely we find so clearly a distinction between theology as the science of religion and theology as the essence of religion. Sciences of religion change as all other sciences change. Religion itself never changes. Dr. Abbott explains in this volume the great fundamental ideas of religion, such as sacrifice, atonement, consciousness of sin, and inspiration, from a naturalistic standpoint. He makes all these operations the result of God's dwelling in man and nature instead of above (the cosmic universe). Religion is a growth, the same as all the other things with which man has to deal. He believes inspiration was more vague under the Jewish dispensation, but that it is gradually becoming clearer and clearer as man becomes more capable to receive it, and that God reveals himself today essentially as in former times. He counts for the genesis of sin on the basis of man's relation to lower animals. By the author's conception of God's rela-

tion to man, much of the discrepancy between science and theology is removed.

THE BOYHOOD OF FAMOUS AUTHORS, by William H. Rideing, Boston; T. Y. Crowell & Co. In the revised form, the reading public, and particularly the juvenile readers, have a picturesque treatment of the boyhood life of seventeen of our famous authors. It is presumably a boy's book, yet older readers will find much of interest and information in this volume. It is a most admirable book to put into a boy's hands.

Such books as The Boyhood of Famous Authors are just the kind to get the young people interested in the right kind of reading. There would be less trashy literature read by the young people if early in life they were fed with the literature of this and similar books. Besides, there is an inspiration throughout which is felt by the young and old alike, who read it. There is a pleasant charm, due to the easy naturalness with which the reader is taken from page to page. No young or old person can read this book without feeling a renewed strength of courage and inspiration.

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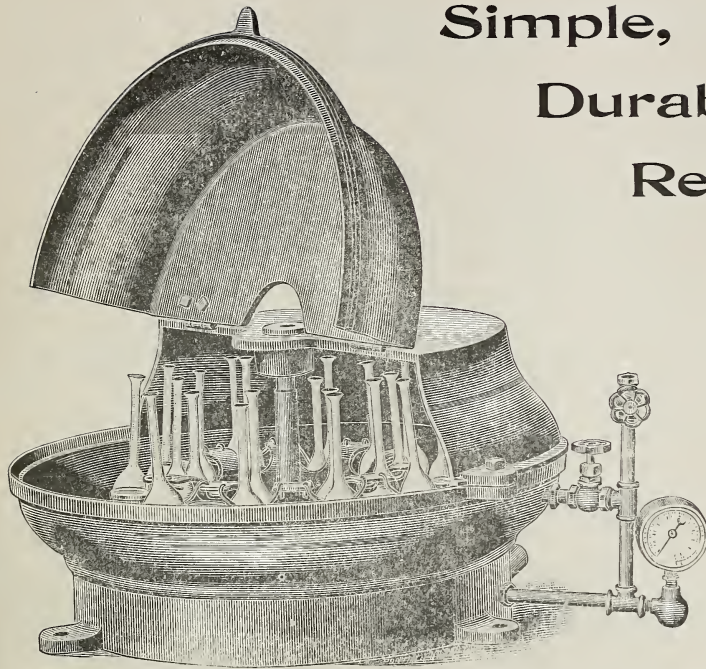
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N. Y. & Boston Ex....	*12:45pm	* 2:15pm
Cleveland & Buffalo...	*12:45pm	* 2:15pm
Delaware & Cleveland.	† 4:15pm	† 9:10pm
Local to Cleveland...	† 4:15pm	† 9:10pm
Southwestern Limited	*10:00pm	* 7:08am
New York & Boston...	*10:00pm	* 7:08am
Buff. & Niagara Ex..	*10:00pm	* 7:08am

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Dayton & Cincinnati...	* 2:10am	* 1:30am
Louisville & Nashville	* 2:10am	* 1:30am
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Dayton & Cincinnati..	* 7:15am	* 9:55pm
Ind'napolis & Chicago	* 7:15am	* 9:55pm
Dayton & Cincinnati..	† 9:25am	† 6:30pm
Local to Cincinnati...	† 9:25am	† 6:30pm
Dayton & Cincinnati..	†12:50pm	† 4:05pm
London & Springfield..	†12:50pm	† 4:05pm
Dayton & Cincinnati..	* 2:25pm	*12:25pm
Ind'napolis & St. L's..	* 2:25pm	*12:25pm
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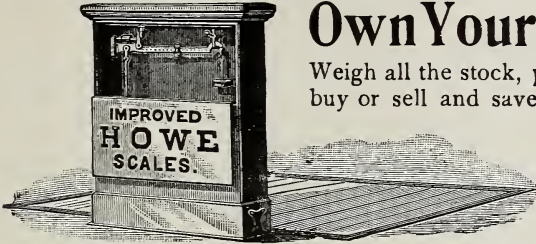
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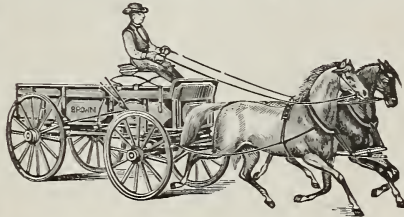
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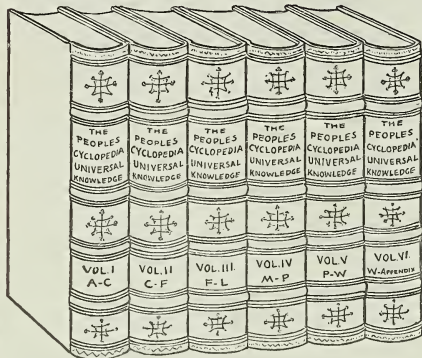
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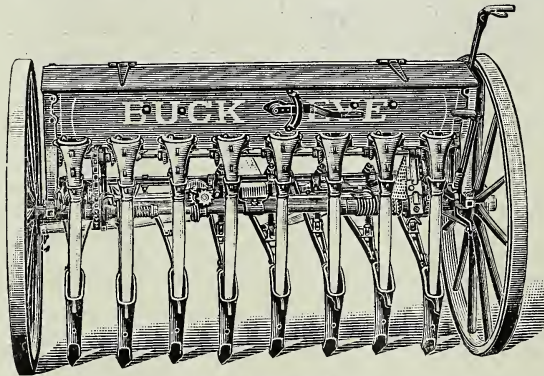
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